APPENDIX E. Analysis of Hunting Opportunities at Pierce, Franz Lake, and Steigerwald Lake National Wildlife Refuges

The National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.) directs the Secretary of the Interior to recognize compatible, wildlife-dependent recreational uses as priority general public uses of the National Wildlife Refuge System (System), to provide increased opportunities for families to experience compatible wildlife-dependent recreation, and to ensure these uses receive enhanced consideration over other general public uses in planning and management for the System. Priority wildlife-dependent uses of the System, as defined by statute, are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The term 'compatible use' means a wildlife-dependent recreational use or any other use of a national wildlife refuge that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the National Wildlife Refuge System or the purposes of the refuge.

The purpose of this appendix is to summarize the analysis of waterfowl hunting opportunities and impacts that the U.S. Fish and Wildlife Service (Service) completed as part of the development of the draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA) for Pierce, Franz Lake, and Steigerwald Lake National Wildlife Refuges (hereafter called Refuge or Gorge Refuges). Although not currently open to the public, the Service leads or authorizes tours and environmental education programs on the Gorge Refuges. In addition, certain public recreational uses of a dike trail along the Columbia River are allowed to occur at Steigerwald Lake Refuge. While this appendix is focused on evaluating public hunting, other public uses were also evaluated in the draft CCP/EA and in separate Compatibility Determinations. Where appropriate, these other uses are briefly described below, with additional information available in the draft CCP/EA.

Pierce Refuge

Refuge Establishment and Purposes

Pierce Refuge is located in Skamania County, Washington, immediately west of the town of North Bonneville and two river miles east (upriver) of Franz Lake. The Refuge was established in 1990 when the Service received a donation of 319 acres from the landowner, Mrs. Lena Pierce, for "wildlife refuge, recreation or park purposes" (warranty deed). In donating the land to the Service, Mrs. Pierce requested that the Service administer the Refuge as an inviolate sanctuary and stipulated that hunting should not be

allowed (U.S. Fish and Wildlife Service 1983). Following the death of Mrs. Pierce in 1988, the Service acquired the remaining 10 acres of private land within the approved Refuge acquisition boundary under the authority of the Fish and Wildlife Act of 1956.

Determination

Consistent with Refuge purposes and the wishes of the donor, the Service does not propose to open Pierce Refuge to public hunting.

Franz Lake Refuge

Refuge Establishment and Purposes

Franz Lake Refuge is located in Skamania County, Washington, approximately ten river miles upstream from Steigerwald Lake Refuge. The town of Skamania is about one mile east of the Refuge boundary. The approved Refuge acquisition boundary encompasses approximately 695 acres, of which 552 acres (79 percent) has been acquired by the Service. The majority (82 percent) of the Refuge, including all of its palustrine and emergent wetland habitats, is located between State Route 14 and the Columbia River. The remainder of the Refuge, north of the highway, is primarily mixed deciduous and coniferous forest.

The Service established Franz Lake Refuge in 1990 under authority of the Fish and Wildlife Act of 1956. The purpose for establishing the Refuge is "to preserve biodiversity along the Columbia River by protecting diverse and now rare Columbia River floodplain wetland and riparian habitat and forested watershed buffer" (U.S. Fish and Wildlife Service 1990). Key resources targeted for protection and management include habitat for a variety of waterfowl, shorebirds, raptors, songbirds, anadromous fish, furbearers, and large mammals. The Refuge provides important wintering habitat for tundra swans; as many as 1,000 have been observed on Franz Lake (U.S. Fish and Wildlife Service 1990). Other waterfowl, such as western Canada goose, mallard, northern pintail, gadwall, green-winged teal, northern shoveler, canvasback, and American widgeon, are common. Cavity-nesting ducks, including wood duck, bufflehead and common merganser, have also been observed. The Refuge provides abundant habitat for wading birds such as great blue heron and rail, and songbirds. Mature cottonwoods along the forested margins of the lakes provide nest, perch and roost opportunities for raptors. A bald eagle nest on the Columbia River in the vicinity of the Refuge has been active for several years.

Existing Public Access and Use

A gravel road provides the only vehicle access onto the Refuge from State Route 14. One section of the road is privately-owned. The Service has an easement agreement with the property owner to use the road for administrative purposes. Under this agreement, the Service cannot permit public use of the road across private property. Although there is

no public access onto the Refuge from the highway, the public can view the Refuge from a viewing platform within the highway and railroad right-of-way. The viewpoint accommodates parking for approximately five cars and provides interpretive panels, but is otherwise undeveloped.

In the preferred alternative for the Gorge CCP/EA, the Service proposes to offer guided tours of lower Arthur Lake via nonmotorized boats. Kayaks and canoes would put in at the U.S. Forest Service's Saint Cloud Recreation Area, and with a Service-approved guide paddle up the Columbia River to the mouth of Arthur Lake. Subject to water conditions and safe passage, the boats would enter the Refuge. Tours would progress no further upstream than the beaver dam at the west end of Arthur Lake, approximately 0.3 miles into the Refuge. Once on the Refuge, portages and foot travel would not be allowed. Disturbance to swans and other waterfowl seeking sanctuary on the Refuge would be avoided by 1) limiting the number of tours per year (maximum of two), 2) requiring participants to remain in their boat, 3) prohibiting access to Arthur and Franz Lakes east of the beaver dam, 4) limiting group size, and 5) offering tours between May 1 and October 1, after the winter waterfowl season has passed. With these stipulations, the proposed guided boat tours are a compatible use of Franz Lake Refuge.

Feasibility and Potential Impacts of Opening Refuge to Hunting

Under the existing easement, the public is prohibited from using the only road that enters the Refuge. Nonmotorized boat access onto the Refuge from the Columbia River may be possible at certain times of the year; however, river access presents significant public safety concerns for the Service. The proposed one or two kayak tours per year would be led by experienced guides and would only be possible when water levels provide a safe entry onto the Refuge. Participants would not be allowed to leave their boats while on the Refuge. There is no existing boat dock or designated anchorage on the Columbia River adjacent to the Refuge. Landing a boat on the undeveloped shoreline would be unsafe due to rapidly fluctuating river levels and the heavy winds and wave action typical of the Columbia River Gorge. River flows are oftentimes high in the winter due to precipitation (Fuhrer et al. 1996). Operations of the Bonneville Dam, combined with tidal action, result in rapid changes in water surface elevation. Furthermore, the riverbanks are sparsely vegetated and the soils are sandy and highly erodible. Uncontrolled boat landings and human foot traffic on the shoreline would have significant impacts to the riverbanks, exacerbating the existing bank erosion problem documented by the Service (U.S. Fish and Wildlife Service 1997, 2001).

The feasibility and costs for developing a boat landing on the Columbia River at Franz Lake Refuge are currently unknown. However, provisions of the Management Plan for Columbia River Gorge National Scenic Area (U.S. Forest Service 1992) prohibit new structural developments or intensive recreation in the Franz Lake area. The Refuge is within the Special Management Area (SMA), which constitute the region's most sensitive lands. The management plan goal for SMA is to protect and enhance recreation opportunities, in part by limiting development and uses, as designated in recreation intensity class guidelines. Franz Lake Refuge is classified as "low-intensity recreation."

The emphasis of these lands is to provide opportunities for semi-primitive recreation. Development of boat anchorages are not a permitted use in low-intensity recreation areas.

In years when a nonmotorized boat may be able to safely enter Arthur Lake from the Columbia River, public access for hunting could be feasible. However, the anticipated negative effects of hunting to waterfowl seeking sanctuary on the lakes in winter would be significant. Franz Lake is the largest and most intact wapato, spikerush, and bulrush marsh remaining on the lower Columbia River; all other areas have been lost or severely degraded (Christy and Putera 1993). Refuge wetlands provide critically important habitat for swans and other waterfowl (U.S. Fish and Wildlife Service 1997). The 2004 midwinter waterfowl survey (data maintained by U.S. Fish and Wildlife Service, Division of Migratory Birds and Habitat Program, Portland, Oregon) indicate only 200 ducks were counted between Steigerwald Lake and the Bonneville Dam, of which only 24 were dabbling ducks. Virtually all of the ducks counted annually along this reach of the Columbia River occur at Franz Lake Refuge.

Determination

The Service does not propose to open Franz Lake Refuge to waterfowl hunting. The existing road easement onto this Refuge is restricted to administrative and management purposes. Boat access onto the Refuge from the Columbia River during the hunting season would be unreliable and unsafe and may exacerbate the existing bank erosion problem. Moreover, allowing hunting on the Refuge's wetlands would significantly reduce sanctuary habitat for swans and other waterfowl in the lower Columbia River.

Steigerwald Lake Refuge

Refuge Establishment and Purposes

Located adjacent to the town of Washougal, Washington, Steigerwald Lake Refuge was established to partially fulfill U.S. Army Corps of Engineers (Corps) obligations to mitigate for the impacts to fish and wildlife resulting from the construction of a second powerhouse at the Bonneville Dam on the Columbia River and relocation of the town of North Bonneville (U.S. Fish and Wildlife Service 1987). Completed in 1983, the construction project resulted in the loss of approximately 1,122 acres of fish and wildlife habitat on the Washington side of the Columbia River (U.S. Fish and Wildlife Service 1982). Among these losses were 42 acres of lakes, ponds and sloughs and 184 acres of pasture. The pastures were highly rated (Habitat Suitability Index value = 0.7) for Canada goose habitat (U.S. Fish and Wildlife Service 1982). Legislation (P.L. 98-396, Sec. 303a) authorized the Corps to acquire not more than one thousand acres in the Steigerwald Lake Wetlands Area "for the fish and wildlife mitigation purposes associated with this project" (i.e., the Bonneville Dam second powerhouse). The Corps acquired the 600-acre Stevenson tract in 1988. This tract was subsequently transferred to the Service for inclusion in a wildlife refuge. The Service accepted the property under authority of the Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645; 100 Stat. 3582). However, the Service determined

it would need to acquire additional land adjoining the Stevenson tract for optimum management as a unit of the National Wildlife Refuge System (U.S. Fish and Wildlife Service 1987). Refuge boundaries were established to include a buffer area needed to isolate wildlife from areas of intensive human activity, as well as to enhance the area for waterfowl and other wetland species that require the formation of wetland impoundments that can be flooded. Acquisitions within the approved boundary would ensure that private property would not be negatively affected by Refuge management activities. In addition once developed, the Refuge would be open for public use and recreation, according to Service regulations and policy.

In the 1990s, the Bonneville Power Administration purchased approximately 326 acres within the Refuge's approved acquisition boundary and transferred these parcels to the Service "for the protection, mitigation, and enhancement of wildlife and wildlife habitat that has been adversely affected by the construction of Federal hydroelectric dams on the Columbia River or its tributaries" (Bonneville Power Administration 1996, 1999). The habitat units gained from the protection of these lands were credited to the Bonneville Dam project as partial mitigation for construction and inundation activities. Habitat Units were projected to increase by 79 percent over the next 15 years.

To date, the Service has acquired approximately 1,049 acres of the 1,406 acres (75 percent) within the approved Refuge acquisition boundary (Figure 1). The largest remaining parcel of private land, approximately 290 acres, is at the east end of the Refuge. As described in the draft Land Protection Plan for Steigerwald Lake Refuge (Appendix L in the draft CCP/EA), acquisition of private inholdings would allow the Service to actively flood a larger portion of the historic Steigerwald lakebed, restore wetland and riparian vegetation for native species, provide additional winter forage for Canada geese, and restore native grassland vegetation. Opportunities for compatible public uses of the Refuge would likely also change when the Refuge is fully acquired.

Current Public Refuge Uses: Columbia Dike Trail

A flood control levee separates the historic Steigerwald Lake floodplain from the Columbia River. Constructed in 1965-1966 by the Corps, the dike marks the south boundary of Steigerwald Lake Refuge. The 5.5-mile long dike rises approximately 15 to 20 feet above the ground elevation. There is a road measuring 12 to15 feet wide on top of the dike and extending its full length. A 3.6-mile long section of this gravel surface road (between Steamboat Landing and the east boundary of the Refuge) is commonly referred to as the Columbia River Dike Trail (Dike Trail; see Figure 1). Approximately 1.1 miles of the Dike Trail are on property owned by the Port of Camas/Washougal (Port) and 2.5 miles of the trail are on the Refuge. The remaining 1.9 miles of dike road (not currently part of the Dike Trail) are on private land within the Refuge's approved acquisition boundary. A locked gate on the dike prevents public access to this section of the road. Vehicle access onto the dike is controlled by the Port. While the Port is legally responsible for maintaining the dike, including the gravel road, the Service retains authority to control public access to and use of the portion of the dike crossing its property.

Although the Refuge is closed to the public, the Service neither enforces the closure on the Dike Trail nor discourages the public from using the trail. Public recreational uses that had been occurring on the Dike Trail prior to Refuge establishment are unofficially allowed to continue on the section of trail that crosses Service-owned lands. Current estimates of public use indicate that during peak use as many as 30 people use the Dike Trail at one time (Dugger 2003). On average, about 10 people (based on 705 surveys; range one to 30 people) can be observed using the trail at one time. Most of this use consists of hikers, bicyclists, and joggers. Dogs are often observed with these users, with about 43 percent of the dogs observed off-leash. Horseback riding also occurs on the Dike Trail, but this use is limited by the size of the parking area for horse trailers on Port property adjacent to the Refuge. When the parking area is full, three to ten horses can be expected to be using the Dike Trail. This amount of use rarely occurs; Dugger (2003) not once observed a horse on the Dike Trail in 705 surveys.

Anticipated impacts to wildlife habitat and potential wildlife disturbance resulting from these uses of the Dike Trail are minimal. Pursuant to the grant of easement, and as required by the Corps, the Port must maintain, repair, operate, and patrol the dike and its appurtenances for flood protection. The gravel road on top of the dike is designed for intensive use by heavy equipment. Levee side slopes (45 to 80 feet) are kept free of shrubs and tall vegetation. Public recreational uses of the Dike Trail result in minimal additional impacts to vegetation, soils, and local hydrology.

At some level, wildlife may be disturbed by the presence and activity of trail users. However, the magnitude of the response depends in part on the distance, the movement pattern of the disturbance, and the animal's access to cover (Gabrielsen and Smith 1995). Observations by Owen (1973) and others suggest that many species of wildlife are habituated to livestock and are less likely to flee when approached by an observer on horseback than by an observer on foot. Unanticipated disturbances involving foot-based recreationists with their dogs may elicit the greatest stress reactions. Most species of wildlife have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct path. Often, when a use is predictable – following a trail or boardwalk or at a viewing deck – wildlife will accept human presence (Oberbillig 2000). To reduce the effects of human disturbance, permanent paths should be used or traffic should be restricted or reduced to certain times of the year in sensitive areas. Public uses are limited to the dike surface which is set back from the fields along the extreme south boundary of the Refuge. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) concluded that a buffer zone of 100 meters would minimize flushing of foraging or loafing waterbirds. Vos et al. (1985) recommended buffer zones of 250 meters on land and 150 meters over water for great blue herons. Primary foraging areas for Canada geese are located 400 feet or more from the Dike Trail, providing a sufficient buffer from recurring human disturbance. Further, riparian forest and old field vegetation buffer the goose pastures and provide a visual barrier. Potential human disturbance to wildlife by recreationists is further minimized by the dike's location at the edge of the

Refuge, which protects the "heart" of the Refuge, including the most sensitive and highest value habitats for wildlife.

A Compatibility Determination for horseback riding, jogging, bicycling, and dog-walking on the dike trail at Steigerwald Lake Refuge is being developed through the development of the Refuge's Comprehensive Conservation Plan, scheduled for release to the public in summer of 2004. Compatibility stipulations would require horseback riders, joggers, bicyclists, and dog-walkers to remain on the highly developed trail. Additionally, a dog-proof fence would be constructed at the foot of the dike if monitoring results indicate dogs are leaving the Dike Trail while on the Refuge. Public information and interpretation would encourage ethical behavior that demonstrates respect for people, fish, wildlife, and plants. Regulations to protect natural resources and maximize visitors' wildlife experience would be clearly posted at the entrance to the Dike Trail. By consolidating compatible uses on a developed trail at the edge of the Refuge, the largest block of habitat would be left undisturbed by human activities to the maximum extent possible.

Planned Refuge Public Uses: Gateway Center and Interpretive Trail

Steigerwald Lake Refuge is situated at the west entrance to the nationally recognized Columbia River Gorge National Scenic Area. Washington State Route 14, a State Scenic Byway, parallels the Refuge, providing outstanding views of the Refuge and Scenic Area. To encourage scenic appreciation opportunities on this travel corridor, the Forest Service's Scenic Area Management Plan proposed a public facility at Steigerwald Lake Refuge, combining the functions of a Refuge office and wildlife / wetlands interpretive and education facility with those of a "gateway" facility. Originally, the location for the Gateway Center proposed in the management plan was on the northern edge of the Refuge, just south of the Burlington Northern Railroad's crossing under State Route 14. The management plan also recommended that a trail be developed from this facility to the Columbia River, using an existing dirt road. At the river, the trail would link to an existing trail on the top of the Columbia River Dike. The Dike Trail would connect visitors to Cottonwood Beach adjacent to the Refuge's west boundary, and, in the future, to public recreation opportunities planned for Forest Service lands east of the Refuge. Acknowledging the sensitive resources of the Refuge, the trail would "highlight, yet protect, the refuge" by imposing use restrictions, such as seasonal closures during critical periods.

In fiscal year 1998, Congress appropriated $840,000 to the Service for initial planning and development of the Steigerwald Gateway Center. The area designated as the location for the Gateway Center was determined by the Service to be unacceptable due to the potential for wildlife and habitat disturbance from the development and use of the facility and interpretive trail. At the Service's request, the Scenic Area Management Plan was amended in 1999 to move the proposed site west to a location adjacent to Gibbons Creek (Figure 1). The concept for an interpretive trail linking the Gateway Center to the Dike Trail was retained by routing the trail along the existing elevated channel of Gibbons Creek (Figure 1). In 1999, the Service approved construction of an interpretive kiosk and

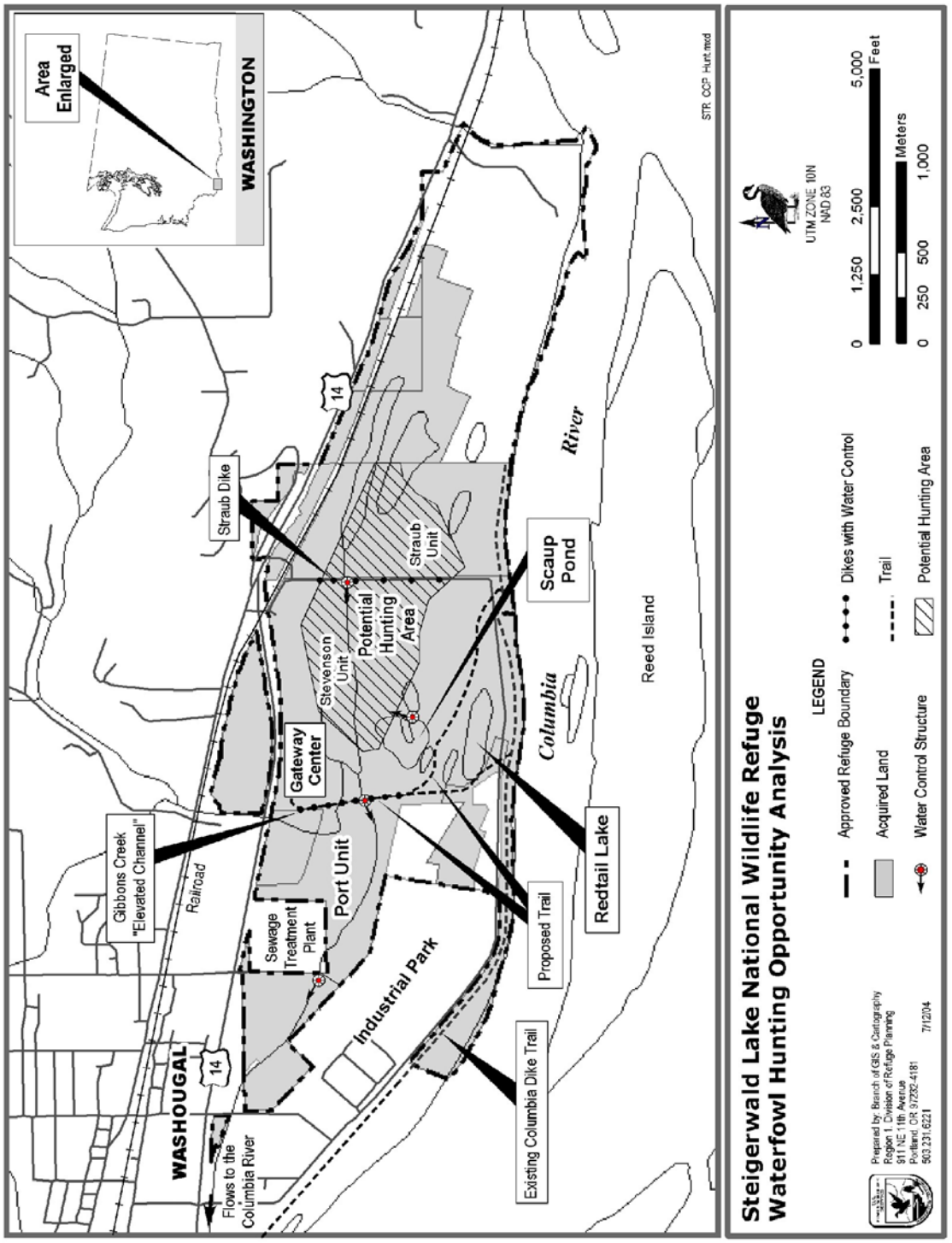
Gateway Center at the new location (U.S. Fish and Wildlife Service 1999). Construction ready plans for the facilities were completed in 2001. Subject to availability of appropriated funding, the Service would construct these facilities. Depending on the availability of funding, the interpretive trail and kiosk may be developed before the Gateway Center is fully funded.

The Service has analyzed the anticipated impacts resulting from construction and operation of the proposed facilities on fish and wildlife (U.S. Fish and Wildlife Service 1999). The Gateway facility was relocated from the site proposed in the Scenic Area management plan to minimize disturbance to wildlife and impacts to Refuge habitats, while providing safe access from State Route 14. Project construction would directly impact approximately six acres. Riparian vegetation would be established on approximately 9.2 acres for visual screening and mitigation purposes. Impacts to wildlife would be further minimized by 1) routing the trail below the elevated Gibbons Creek channel, 2) seasonal closure (October 1 through April 30) of the east fork trail, 3) restricting use to walking only, prohibiting dogs and other domestic animals from the trail (except on the Dike Trail), 4) restricting all traffic to the trail, and 5) through public interpretation and education. With these stipulations in place, wildlife observation and photography, and environmental education and interpretation at the Gateway Center and on the interpretive trail and Dike Trail are compatible. The Compatibility Determination that was signed in 1999 will be revised through the Refuge's CCP/EA, scheduled for release to the public in the summer of 2004.

Potentially Suitable Hunting Area

For purposes of this analysis, safety buffers, ranging in width from 250 to 300 yards, were proposed based upon the level or frequency of non-hunting uses in the buffer area and the range of shot commonly used for hunting ducks and Canada geese. At nearby Ridgefield National Wildlife, hunters commonly use size four or larger shot. The maximum range of size four lead shot is 286 yards at a striking velocity of 96 feet per second (Davis 1981). To ensure public safety, a 300-yard wide no-hunting zone would need to be maintained around high public use areas, including the future Gateway Center and interpretive trail and the existing Dike Trail. A 250-yard wide retrieval only (no-shooting) zone would need to be established to protect the less-frequented railroad corridor along the Refuge's northern boundary and private property at the east end of the Refuge.

The area considered safe for waterfowl hunting is approximately 187 acres in size and is located at the center of the Refuge (Figure 1). The Straub Dike bisects this area in a north-south direction. Within this area, hunting blinds could be established and opened to the public during daylight hours for duck and Canada goose hunting during the Washington State waterfowl hunting season (October- January). A registration system, similar to Ridgefield Refuge's system, could be developed. Public access to the blinds could be from the Columbia Dike and/or Straub Dike. If access was from State Route 14 or the Gateway Center, a trail would need to be developed to the blinds.


Area Enlarged
WASHINGTON
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Straub Dike
14
Straub Unit
Potential Hunting Area
Stevenson Unit
Scaup Pond
Columbia River
Reed Island
Gateway Center
Gibbons Creek "Elevated Channel"
Railroad
Sewage Treatment Plant
Port Unit
Industrial Park
Proposed Trail
Redtail Lake
Existing Columbia Dike Trail
WASHOUGAL
14
Flows to the Columbia River
Steigerwald Lake National Wildlife Refuge
Waterfowl Hunting Opportunity Analysis
LEGEND
Approved Refuge Boundary
Acquired Land
Water Control Structure
Dikes with Water Control
Trail
Potential Hunting Area
UTM ZONE 10N
NAD 83
0 1,250 2,500 5,000 Feet
0 250 500 1,000 Meters
Prepared by: Branch of GIS & Cartography
Region 1, Division of Refuge Planning
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503 231 6221
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Potential Impacts from Waterfowl Hunting at Steigerwald Lake Refuge

Habitat types within the hunting area include open-water, wetlands, and upland grasslands. The grasslands include "managed fields" (pastures) and "old fields." Vegetation in managed fields is maintained in a nutritious condition for Canada geese through mowing and grazing. Old fields are former pastures no longer regularly mowed or grazed but occasionally treated for weeds. The wetlands consist of seasonal and semi-permanent wetlands and wet meadow. The predominant species of vegetation in wetlands is non-native reed canary grass.

Fifteen species of waterfowl regularly utilize the Refuge including Canada geese, white-fronted geese, mallard, shoveler, cinnamon and green-winged teal, and wood ducks. Canada goose utilization of Steigerwald Lake consists predominantly of Cackling Canada geese and Western Canada geese with an average population of 2,000 birds, though this number varies significantly throughout the season. Cackling Canada geese are the most abundant subspecies at Steigerwald Lake Refuge, generally present from October through April. They prefer large open fields and are generally the cause of many of the depredation complaints in the lower Columbia River region.

Waterfowl can have variable responses to human disturbance depending on the duck species or goose subspecies, season, and type of disturbance (hunting, vehicles, foot traffic, and dogs). In areas of limited disturbance, waterfowl may remain wary and spook with minimal provocation. In contrast, birds subjected to high levels of passive disturbance, such as slow-moving vehicles, often become less wary to these disturbances, though they become acutely vigilant and may flush at the introduction of a non-anticipated disturbance, such as speeding vehicles, dogs, or hikers. Hunting is known to sensitize waterfowl to all disturbances, thus changing behavior patterns and increasing the propensity to flee. Hunt-related disturbances have been shown to double the amount of time that snow geese remain in an alert status (non-foraging) as compared to non-hunting disturbances (Belanger and Bedard 1995).

Studies have consistently demonstrated that disturbance by people even at a low-level can result in energetic costs to birds (Frederickson and Drobney 1979; Boyle and Samson 1985; Dahlgren 1988). These energetic costs include loss of body reserves (Anderson 1995; Raveling 1979) which can reduce winter survival (Morton et al. 1989), and reduce reproductive potential the following spring (Bartelt 1987). Studies on pintails (Wolder 1993) indicate that pintail stop foraging and remain alert for approximately twice the duration due to human disturbances versus natural disturbances. This represents an energetic loss to the birds due to hunter presence, as birds spend considerable time in a non-foraging status, even if hunting does not actively disperse birds.

Hunting can also alter the distribution, abundance, behavior and feeding patterns of waterfowl (DeLong 2002; Knight and Cole 1995). Over two dozen studies cited in DeLong (2002) report that waterfowl decrease their use of wetlands that are hunted or disturbed, opting for less disturbed sites or sanctuary areas. Depending on intensity and duration, hunting disturbance may cause long term avoidance of hunted wetlands,

affecting not only the wildlife but also the hunting and non-hunting user groups that seek these species (Bias et al 1997).

The potential impacts of waterfowl hunting on national wildlife refuges are commonly mitigated through the presence of alternate foraging and roosting sites (sanctuaries) within or adjacent to the Refuge wetlands. However, at Steigerwald Lake Refuge, these impacts are not easily mitigated for the following three reasons.

1. Lack of alternate wetlands on-Refuge

Of the current potential wetland habitat on the Refuge, approximately 55 percent occurs west of the elevated Gibbons Creek channel within the Port Unit (Figure 1). However, this area, managed for flood control for the Port of Camas/Washougal, would provide minimal wetland habitat for waterfowl that may be displaced from higher quality habitat east of the elevated channel. The area is dominated by a monoculture of reed canarygrass which provides little value for wildlife; the only open water exists within the old Gibbons Creek channel which is water quality deficient and generally too deep for efficient dabbling duck foraging. Dabbling ducks are the primary species that utilize Steigerwald Lake due to its habitat types and food resources. Recognizing the management limitations posed by the surrounding non-Refuge lands adjacent to the Port Unit, the preferred alternative in the CCP/EA (alternative B) proposes to convert much of the canarygrass cover into scrub-shrub habitat.

Most of the remaining wetlands suitable for waterfowl occur within the main lakebed on the Stevenson and Straub Units (Figure 1). The suitable hunt area would encompass approximately 49 percent of the remaining wetland habitat; this does not include the zone of disturbance that would occur within adjacent buffers.

In summary, hunting could occur on about one-half of the emergent and open water wetlands on the Stevenson and Straub Units (Figure 1). These wetlands provide the best seasonal emergent wetlands for waterfowl foraging. However, the disturbance from hunting would re-distribute waterfowl, primarily ducks, into the least productive emergent wetland habitat and onto deep water channels or ponds. Under this scenario, it is likely that ducks would either forego foraging opportunities on the Refuge, forage in energetically-deficient wetlands (i.e., deep water), or disperse from the Refuge.

2. Lack of alternate wetlands off-Refuge

Given the scenario above, most ducks and wetland-foraging geese would likely be forced to disperse from the Refuge. This would result in a) birds limiting their daily foraging time, b) roosting/loafing on the Columbia River, where they are subjected to intensive recreational disturbance, c) birds flying extended distances to alternate foraging sites, thus severely compromising their energetic requirements, and d) birds abandoning the Refuge during the hunting season.

Few emergent wetlands exist within the Columbia River floodplain upriver of Steigerwald Lake (U.S. Fish and Wildlife Service 1997; Christy and Putera 1993). The midwinter waterfowl survey conducted in 2004 (data maintained by U.S. Fish and Wildlife Service, Division of Migratory Birds and Habitat Program, Portland, Oregon) indicate only 200 ducks were counted between Steigerwald Lake and the Bonneville Dam, of which only 24 were dabbling ducks. Virtually all of the ducks counted annually along this reach occur at Franz Lake Refuge. This is the general species composition and approximate population counted in previous years. Given the likely dispersal distance of ducks from roost sites to foraging, it is not expected that ducks would disperse to Franz Lake when hazed from Steigerwald Lake. Surveys and incidental observations of ducks that roost nightly on Ridgefield Refuge (25 miles downriver from Steigerwald Lake) often show significant numbers of birds returning in the evening from a south-southeast direction, which is the general direction of Steigerwald Lake. It is unknown where many of these ducks are foraging; however, waterfowl surveys indicate that these ducks are not dispersing as far as Steigerwald Lake.

The only comparably-sized emergent wetland habitat that occurs within a short flight distance of Steigerwald Lake is the Sandy River Delta. This recreational site, managed by the U.S. Forest Service, is open to hunting and a wide variety of other public uses that limit waterfowl use of the wetlands. The emergent wetland habitat is dominated by reed canarygrass, water levels are dependant upon Columbia River levels and seasonally tenuous, and there are no waterfowl sanctuary areas. Additional diurnal sites for ducks include Blue Lake (Oregon) and Lacamas Lake (Washington); however, these sites have unrestricted public access, including boating, and do not offer comparable emergent wetland habitats; waterfowl surveys indicate minor waterfowl use on these lakes.

In summary, there are few alternate emergent wetland systems that could be utilized by ducks should they be hazed from the Refuge by hunting activities. None of these sites would be comparable in type or size to the Refuge. Ducks would need to shift use to alternate habitat types of lower quality and with less energy-efficient foraging opportunities.

3. Lack of suitable alternate Canada goose forage sites

Canada geese, particularly cackling Canada geese, prefer open short grass habitats for foraging, and open shallow wetland habitats for diurnal roosting and loafing. Western Canada geese are fairly adaptable and because they forage in relatively small flocks (less than 50 birds), they are able to use a wide variety of habitats. Cackling Canada geese, which comprise approximately 90 to 95 percent of the Refuge goose population, forage in large flocks (usually more than100 birds and up to or exceeding 1,000 birds at Steigerwald Lake). These flocks require extensive grasslands that have been grazed, mowed, or hayed to produce short, succulent grasses. Steigerwald Lake Refuge is the only public land base within approximately 20 miles that is managed specifically for geese. Alternate foraging sites are limited to private agricultural lands or pastures, which are not specifically managed for geese and where goose use often results in depredation of crops.

Because the potentially suitable hunting area on Steigerwald Lake Refuge overlays the primary goose foraging units (i.e., those managed for and intensively used by Canada geese), it is expected that most cackling Canada geese would respond to hunting disturbance by searching off-Refuge for alternative foraging opportunities. Buffer areas around the hunting zone (Figure 1) may provide foraging habitat, but these areas would not be sufficient to support the current population of Canada geese using the Refuge. Intensive and concentrated foraging in these few sanctuary areas would likely lead to severe degradation of the grassland habitat.

In summary, hunting is expected to temporarily displace Canada geese from the Refuge, particularly cackling Canada geese. This displacement would probably be long term (duration of the hunt season) given the lack of available suitable foraging sites on-Refuge or on adjacent public land. Permanent displacement resulting from changes in foraging behavior could occur, given the distances geese would need to disperse for energetically-efficient foraging opportunities. Some geese, particularly Western Canada geese, would likely forage more extensively on private agricultural lands compounding the depredation issues adjacent to the Refuge, as well as on lands north and south of the river. Goose hunting would not support one of the key objectives for the Pacific Flyway Management Plan for the Northwest Oregon - Southwest Washington Canada Goose Agricultural Depredation Control (Pacific Flyway Council 1998), which is to design public use programs on wildlife refuges to minimize disturbance to wintering Canada geese.

Determination

The Service does not propose to open Steigerwald Lake Refuge to waterfowl hunting at this time. Opening currently owned Service land within the Refuge acquisition boundary to hunting would not achieve Refuge purposes, goals, and objectives and would materially interfere with or detract from the fulfillment of Refuge purposes. The hunting area would be centered on the Refuge's highest quality wetland and open-water habitat, and would overlay primary use areas for Canada geese. Given the small size and configuration of Refuge habitats, little viable sanctuary could be offered in conjunction with a hunt program. Waterfowl would most likely disperse from the Refuge into marginal habitats or onto off-Refuge sites. This displacement would have significant energetic costs to these waterfowl and would likely result in long term displacement of waterfowl from the Refuge. Canada geese that leave the Refuge may cause agricultural depredation problems on surrounding private lands.

The Service does not currently control all of the lands within the approved acquisition boundary for Steigerwald Lake Refuge (Figure 1). Should these lands be acquired in the future, the Service would re-evaluate its options for the public use program, including a re-assessment of a waterfowl hunting program.

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